Age and its Effect on the Older Driver

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Demographic Imperative

- Persons over age 65 currently represent 13% of US population
- By 2040, persons over the age of 65 will represent 20% of US population
- Fastest growing segment of elderly are those over the age of 80.

Life Expectancy for Older Person by Age, Race, and Sex

Age	White Men	White Women	Black Men	Black Women
65	17.2	20.0	15.2	18.6
70	13.7	16.2	12.4	15.3
75	10.7	12.8	9.9	12.2
80	8.1	9.7	8.0	9.6
90	4.3	5.1	4.9	5.7
100	2.2	2.5	2.9	3.2

The “Old Old”

- **2012**

53,000 persons >100 years

1.9 million persons 90-99 years

- **2040** (projected)

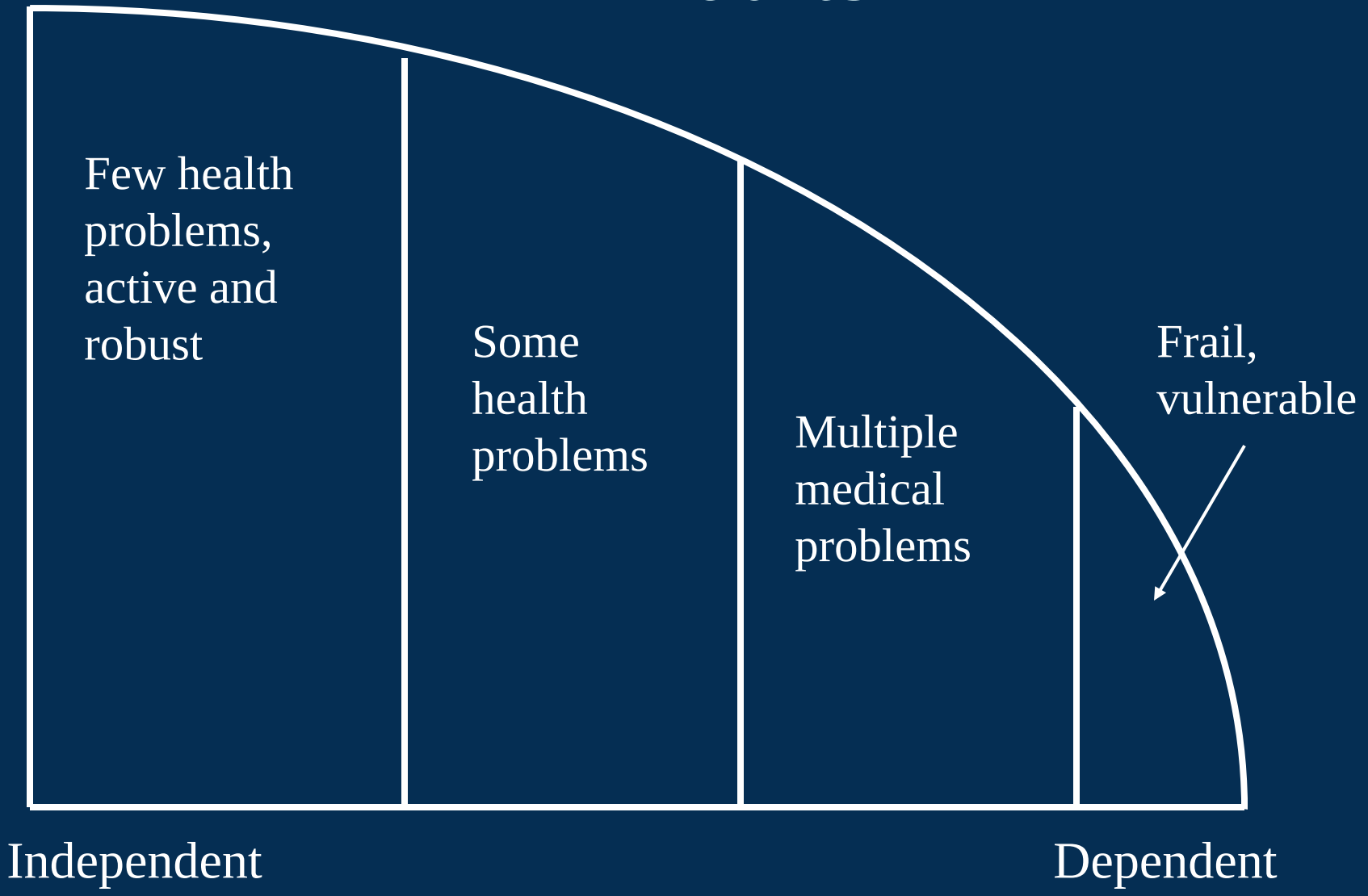
250,000 persons >100 years

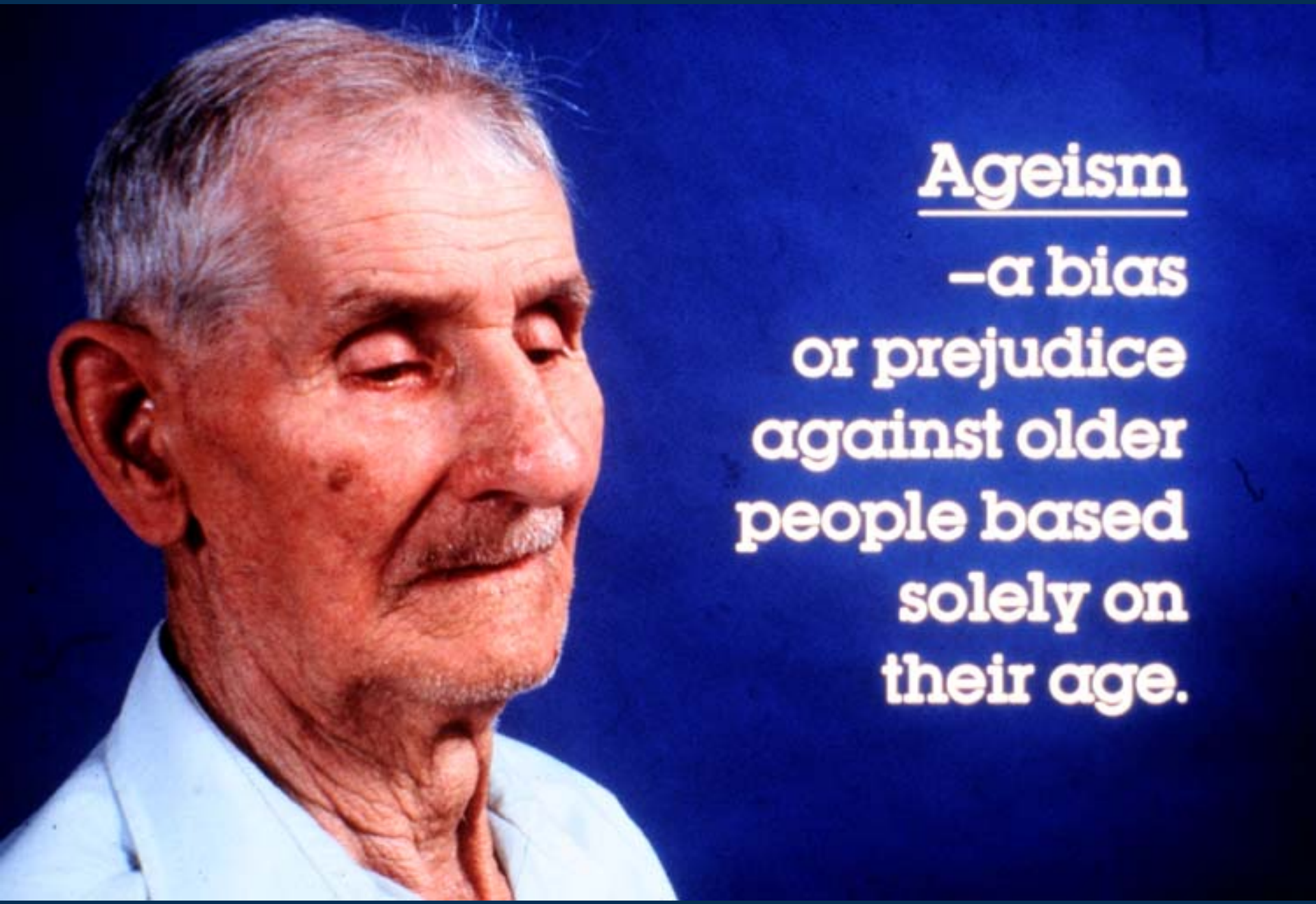
9 million persons 90-99 years

Average Life Expectancy

- Asian Woman in Bergen County, NJ 91
- Roland Park, Baltimore, MD 83
- White Woman in US 78
- White Man in US 75
- African-American Man in US 69
- Hollins Market, Baltimore, MD 63
- South Dakota Native American Man 58

Heterogeneity in Health of Older Adults




Ageism
–a bias
or prejudice
against older
people based
solely on
their age.

Driving

- Freedom
- Independence
- Increased shopping options: economic benefits and improved lifestyle
- Increases opportunity for hobbies/interests, time with family and friends, socialization

Risks from Loss of Driving Privileges

Depression

Loss of social outlets

Limited access to cheaper food/clothing

Loss of access to health care

Increased mortality

Drivers over age 65

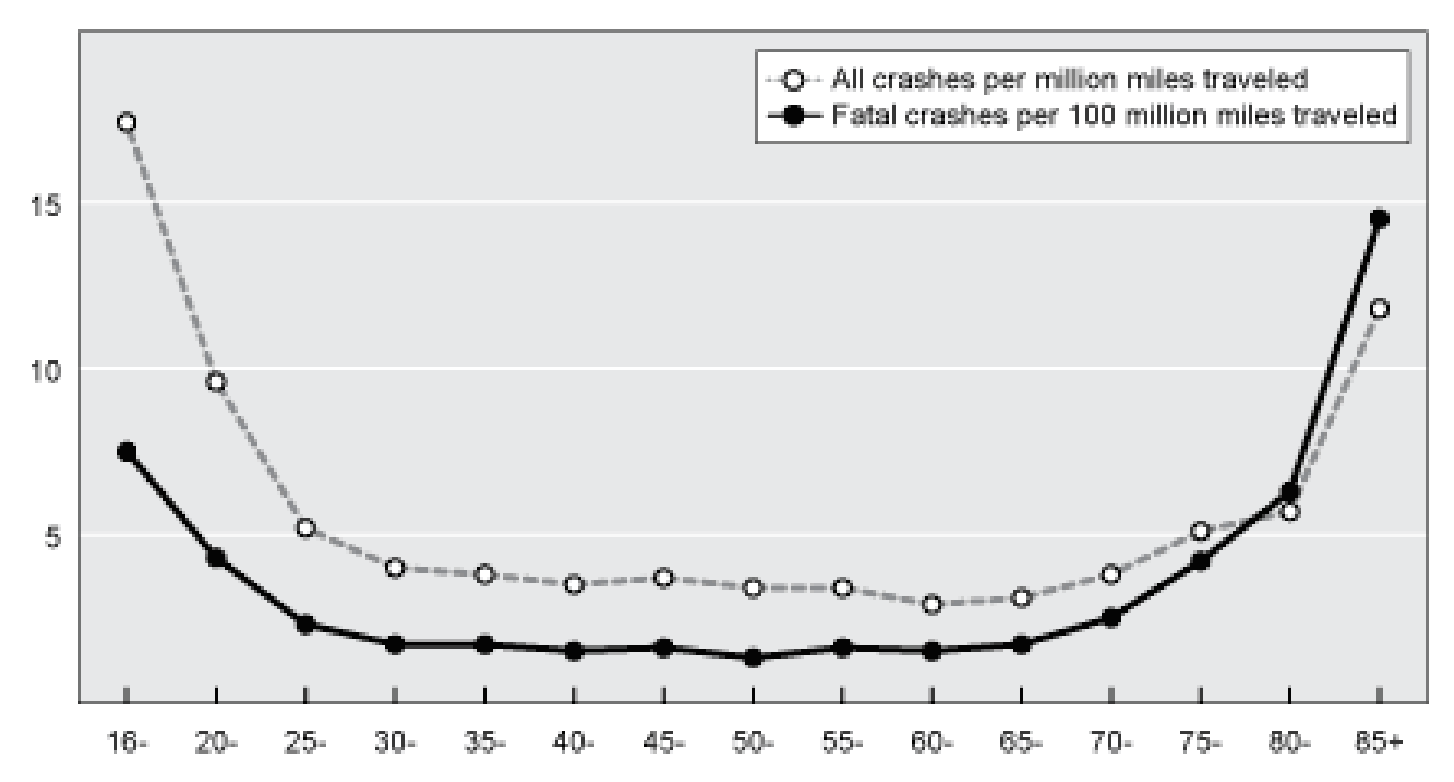
- 2010: 15% of all drivers are over age 65
- 2025, an estimated 25% of all drivers will be over age 65

Driving habits of the Elderly

- Drivers 80 and older are more than twice as likely as drivers 65-69 to self-limit driving

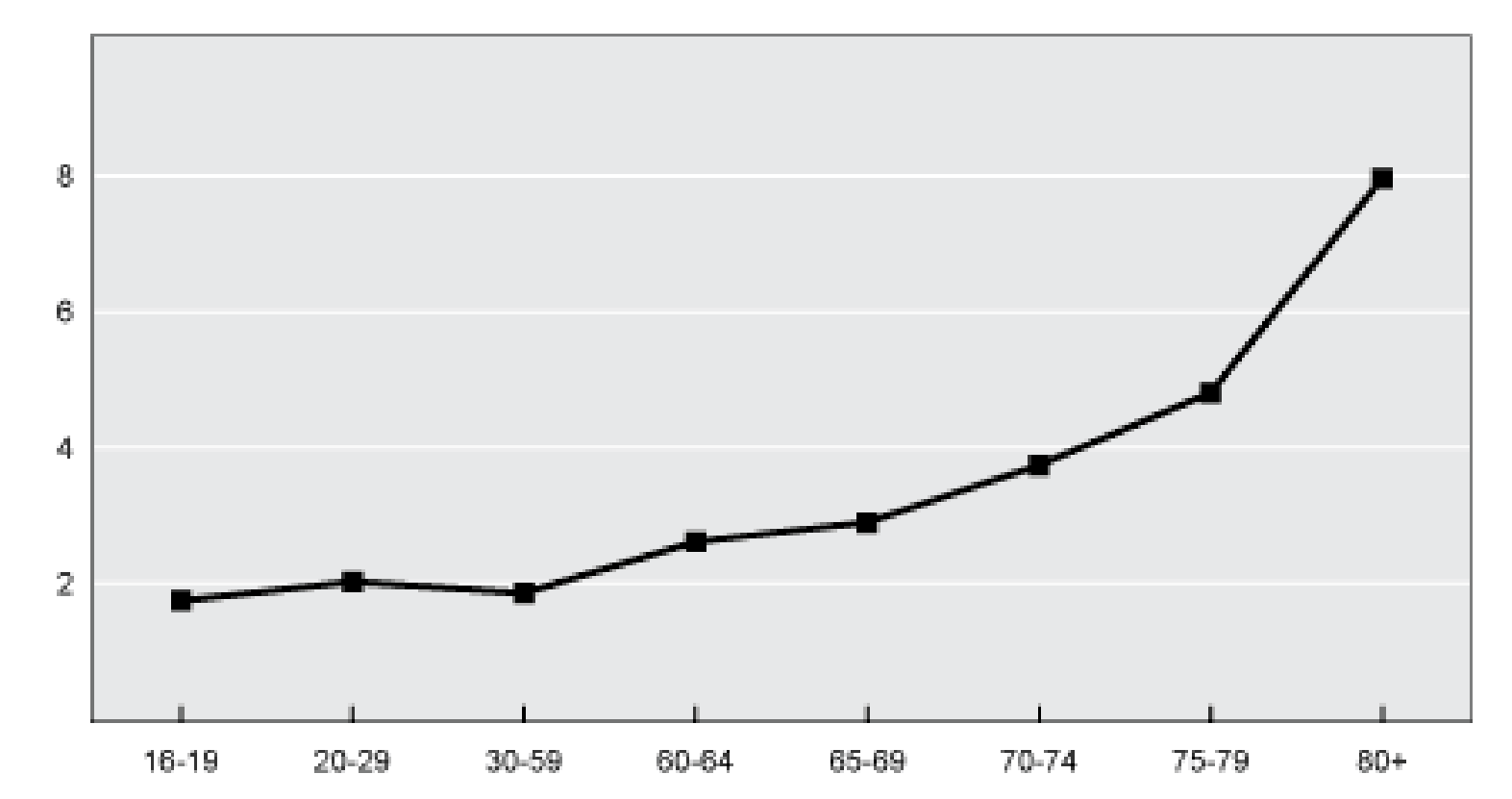
- More older drivers avoid night driving, make fewer trips, travel shorter distances, avoid interstate highways and roads that are icy or snowy

Number of crashes per mile traveled by driver age, 2001-02



Q&As: Older People. Insurance Institute for Highway Safety. April 2009.

Number of driver deaths per 1,000 drivers , by age



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NHTSA Study (1995)*

Senior citizens account for:

- 5% of all people injured in traffic crashes
- 13% of all traffic fatalities
- 13% of all vehicle occupant fatalities
- 18% of all pedestrian fatalities
- *12% of US population >65 years

Traffic Fatalities Involving Elderly

- 82% happened in the daytime
- 71% occurred on weekdays
- 75% involved a second vehicle

Motor Vehicle Accidents and the Elderly

- In a crash between an older and younger driver, the older driver was **3 times** as likely as the younger driver to be the one struck; may still be responsible

- In 28% of crashes involving older drivers, the drivers were **turning left** when they were struck- 7 times more often than younger drivers were struck while making left turns

- Older drivers involved in fatal crashes and fatally injured older pedestrians had the lowest proportion of intoxication of any age group

Driver License Renewal Cycle & Increasing Age (50 states & DC)

Jurisdiction	Standard	Older Drivers
AZ	12 yrs (update photo)	5 yrs at 65
CT	6 yrs	2 yrs optional at 65
FL	8 yrs	6 yrs at 80
HI	8 yrs	2 yrs at 72
IA	5 yrs	2 yrs at 70
ID	4-8 yrs (drivers option)	4 yrs at 63
IL	4 yrs	2 yrs at 81-86; 1yr at 87+
IN	6 yrs	3 yrs at 75-84; 2 yrs at 85+
KS	6 yrs	4 yrs at 65
ME	6 yrs	4 yrs at 65

Driver License Renewal Cycle & Increasing Age (50 states & DC)

Jurisdiction	Standard	Older Drivers
MO	6 yrs	3 yrs at 70
MT	8 yrs	4 yrs at 75
NC	8 yrs	5 yrs at 54
ND	6 yrs	4 yrs at 78
NM	4-8 yrs (drivers option)	4 yrs at 71-74; 1 yr 75+
PA	4 yrs	2 yrs optional at 65
RI	6 yrs	2 yrs at 75
SC	10 yrs	5 yrs at 65
TX	6 yrs	2 yrs at 85

19 of 51 (37%) jurisdictions

Jurisdictions Requiring Road Test at Renewal Based on Age

Jurisdiction	Age
Illinois*	75+
New Hampshire	75+

*Also has more frequent renewal cycles at ages 81 and 87

Renewal-by-Mail not an option for those over age 70

- Arizona
- California
- Illinois
- Louisiana
- New Hampshire

Does Regulation Matter?

- **States** with laws requiring **in-person driver license renewal** had a **17% lower fatality rate** per licensed driver **among those aged over 85** compared with States without such laws; **no difference for younger aged drivers** noted

- No difference in fatality rates per driver aged 65 and older for States with and without laws for vision testing, road testing , or shortened renewal periods; no comparative data available for those specifically over age 85

Ideal Driving Restrictions

- Allow drivers to continue to drive in conditions that are safe and based on individual abilities

- May include no driving on high-speed roads, outside a certain area, or at night

Iowa

- Drivers 70 and over who were identified for further testing had more

  a) visual impairment

  b) prescription medications

  c) physical mobility limitations

California

- Regardless of one's age, mandated **driver retesting for anyone involved in a fatal crash or three or more crashes in one year**

- Drivers **over age 70 must retest if they are involved in two or more crashes in one year**

Hawaii

- State Legislature is considering a bill authorizing a study to look at banning driving after a certain age and toughening license renewal requirements
- Attorney General to evaluate whether targeting older drivers constitutes age discrimination

Illinois

- Requires drivers aged 81 to 86 to renew their license every two years instead of the usual four
- Drivers over the age of 87 must renew annually in person
- Over age 75, no renewals by mail, and vision test and on-road driving test required at every renewal

Maryland

- State Law allows police, doctors and residents including relatives to refer potentially unfit drivers to the Motor Vehicle Administration's Medical Advisory Board without risk
- Police refer approximately 700 people annually, 60% of whom are over age 65
- Tiered screening tests being assessed/developed
- Drivers who performed poorly on select cognitive measures were approximately 25% more likely than other drivers to have a subsequent at-fault crash controlling for age, gender, and mileage driven annually

Massachusetts

- Drivers must pass a vision test every 10 years regardless of age

- Bill being proposed to require drivers older than 85 to pass a vision and road test every five years

Nevada

- Renewal-by-mail for those over age 70 must include a medical report

- Mandatory reporting by physicians of medical problems that may impair driving safety

New Jersey

- No laws limit older drivers
- Senate bill under proposal would: provide $3 million to create senior citizen “safe driving health centers” that would offer hospital-based medical and diagnostic services to improve older people’s driving capacity
- Centers would assess the need for a senior’s car to be modified by adjusting brakes, mirrors, seating and/or steering
- Offer auto insurance premium reductions for three years to older drivers who complete a safe driving program

Pennsylvania

- State Law **requires** physicians to report disabilities (psycho-motor, visual, and cognitive) that may affect driving ability

AARP

- Supports stricter licensing renewal policies and pre-license screening that is **not age-based**

- “What determines your safety isn’t your age but your ability”… Elinor Ginzler, AARP Sr. VP for livable communities

Trauma and the Elderly

- Seventh leading cause of death in Americans older than age 65

- Elderly who are injured have:
  - more severe problems from same trauma
  - more likely to have co-morbid conditions
  - more likely to suffer complications
  - more likely to die following trauma

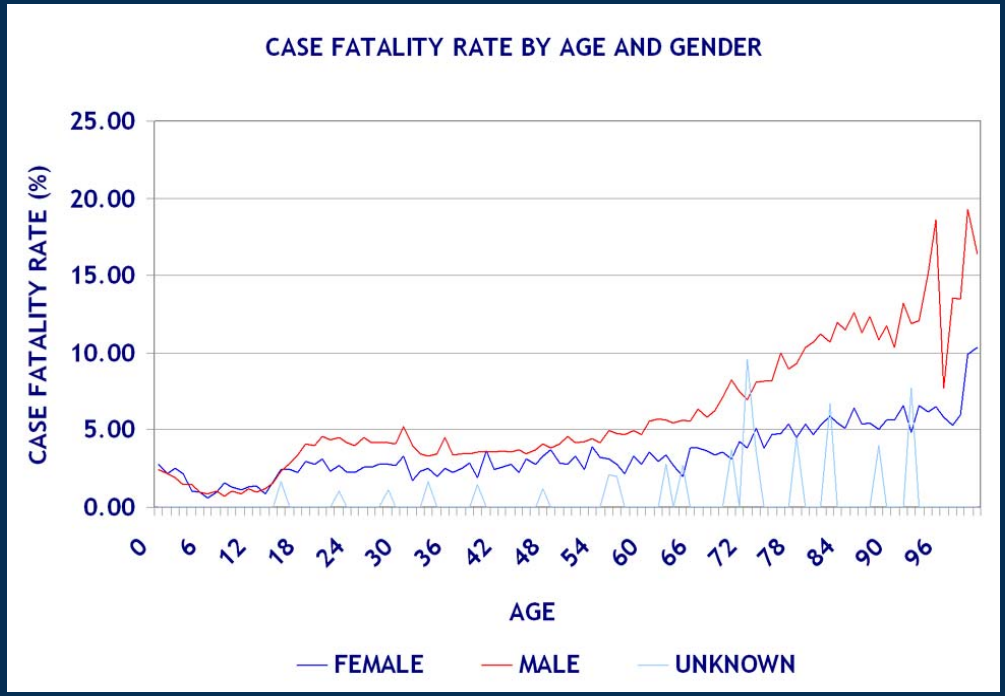
- Account for 25% of all injury fatalities per year and consume 33% of healthcare resources spent on trauma

Trauma in the Elderly

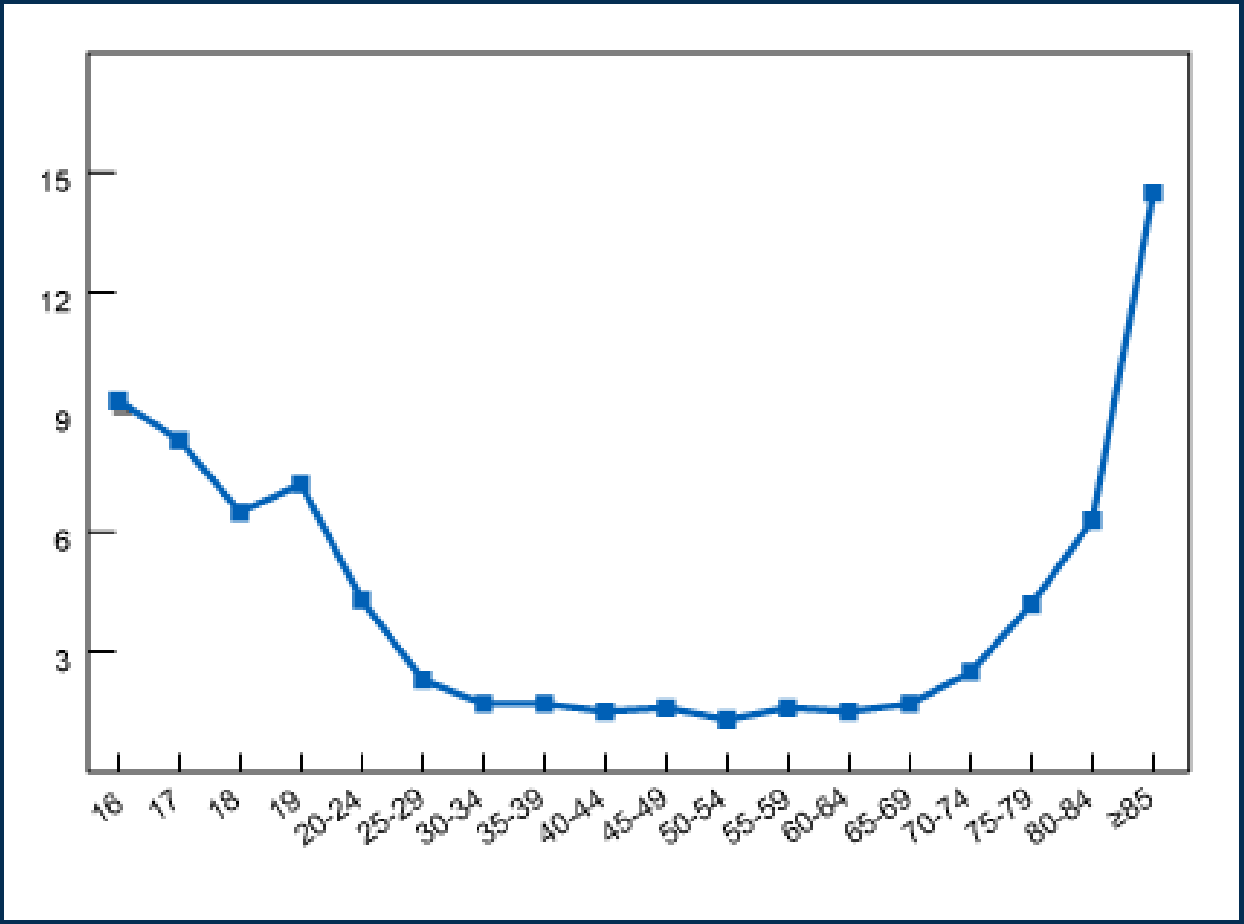
- Motor Vehicle Accidents are the most common cause of death from trauma through age 79 and remain a significant risk throughout life

- Falls are the leading cause of injury deaths among adults aged 80 and older

Case Fatality by Age and Gender



Fatal crash involvements per 100 million miles by driver age



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Motor Vehicle Crashes (MVC)

22 million licensed drivers over age 70 in 2008 vs. 18 million in 1997

In 2008 more than 183,000 older adults were injured in motor vehicle crashes

500 older adults every day

3,981 people over age 70 died in MVA in 2009, 32% lower than in 1997

Failure-to-yield Accidents

- More “failure-to-yield” crashes with increasing age
- Drivers **aged 70-79** more commonly **fail to properly judge** whether there was time to proceed across intersection/lane
- Drivers **over age 80** more commonly **fail to see** the other vehicle

Historical Features Associated with Increased Car Accident Risk

- Female gender
- Polypharmacy
- Self-restriction of driving, citations, accidents
- Screening questions
  - Do you think you are a safe driver? Ever get lost while driving?
  - Do you have any problems while driving?
  - Have you had any tickets, accidents, or close calls?
  - Have you noticed any damage to your car that is hard to explain?
  - Who rides in the car with you?

Considerations for the Elderly Driver

Normal Age-Related Changes

Age-Prevalent Disease

Non-specific and Atypical Presentation of Illness

Aging: End Result

- Decreased Physiological Reserve:
  ”Homeostenosis”

- Less able to respond to “Stressful” situations in same way as earlier in life

Effects of Normal Aging

- **Reduced cardiovascular reserve** and ability to maintain homeostasis
- **Reduced Extra- and Intracellular volume** and hypothalamic response to changes in osmolarity/ thirst: hypo/hypernatremia and hyper/hypoglycemia more common without classic warning signs
- **Altered renal and adrenal response** to changes in volume and electrolytes

Effects of Normal Aging

- Changes in body composition, receptor sensitivity, and hepatic and renal function **increase risk** of **medication side-effects and unwanted actions**

- **Decreased ability to respond to and recuperate from a traumatic injury** leads to more LTC and Rehabilitation

Effects of Normal Aging

- **Changes in posture, muscle mass, joint and neuromuscular function** increase risk of impaired driving ability

- Less Brain, heart, kidney cells with age result in **more permanent functional loss with organ damage due to injury**; age-prevalent illness reduces this further

Effects of Normal Aging

- **Sensory Changes** with aging (hearing and vision) increase risk of delirium, ability to participate in own care and recovery; impact on driving skills

Normal Aging and Trauma

- Decreased wound healing
- Reduced osteoblastic activity leading to **delay in bone healing**; reduced BMD predisposes to fractures
- **Increased susceptibility to infection** due to underlying illness and decreased immune function with age; atypical presentation common

New Focus of Geriatric Assessment

Identification of Frailty

- Sub-set of Elderly Persons considered to be at Greatest Risk (3-7% of elderly)
- A Clinical Syndrome of weight loss, fatigue and weakness thought due to changes in the endocrine and immune systems
- A Prognostic Factor for poor outcomes

Frailty: A driving risk!

- Reduced Overall Physical Function
- Worsening Mobility
- Worsening ADL Independence
- Increased Risk of Hospitalization
- Increased Risk of Death

Age Related Factors* Influencing Safe Driving

- Vision
- Hearing
- Ability to Turn Neck-speed and angle
- Response Time
- Upper arm mobility, strength and coordination
- Lower extremity sensation, strength, and coordination
- Cognition/judgment
- Age-prevalent disease/Atypical presentations

*Great variability from person to person; need individualized assessment

Vision

- **Normal Aging**: Presbyopia/Refractive lenses; increased “glare”

- **Age-Prevalent Diseases**:

  Macular Degeneration (central vision loss early)

  Cataracts

  Glaucoma (peripheral vision lost early)

  Diabetic Retinopathy

  Hypertensive Retinopathy

  Vascular occlusion

  Field of Vision may be additionally impaired by kyphosis, limited mobility, neuromuscular problems, visual field cuts

Hearing

- **Normal Aging**: Presbyaccusis

- **Age-Prevalent Disease**:

  Tinnitus

  Otosclerosis

  Cerumen impaction

  Neurosensory and conductive hearing loss

Age-prevalent Diseases Impairing Ability to Move Neck

Arthritis

Ankylosing spondylitis

Spinal Stenosis

Polymyalgia Rheumatica

Osteoporosis with kyphosis

Scoliosis

Parkinsonism

Age and Upper Arm Strength, Mobility, and Coordination

- Higher prevalence of Stroke with impairment
- Spinal stenosis
- Parkinsonism
- Senile Tremor
- Cachexia
- Muscle atrophy
- ALS
- Polymyalgia rheumatica
- DJD/Rotator Cuff Impairment

Age and Lower extremity mobility, strength, and coordination

- Normal age effect on sensory/position sense
- Higher prevalence of stroke with impairment
- Spinal stenosis/Disc abnormality
- B12 deficiency (pernicious anemia)
- Folate deficiency
- Muscle atrophy
- Diabetic neuropathy
- Arthritis/DJD
- Hip dysfunction/prosthesis

Age and Response Time

- **Normal aging**: decreased psychomotor response time
- **Age-prevalent Disease**:

Stroke

Diabetic neuropathy

Parkinsonism

Muscle atrophy

Spinal stenosis/disc abnormality

Cognitive changes:

Dementia/delirium/depression

Vitamin B12 and/or Vitamin D Deficiency

Causes of Altered Cognition

Normal aging: Benign Senescent Forgetfulness

Age-Prevalent Diseases:

Dementia

Delirium (confusion, disorientation, etc.)

Depression

Medication side-effects

Miscellaneous age-prevalent diseases potentially affecting cognition: diabetes, orthostatic BP changes, hypertension, uremia, urinary tract infection, liver failure, cancer, sub-clinical hypothyroidism, B12 deficiency, Vitamin D deficiency

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Dementia

Present in 20% of persons >80

Alzheimer's disease (50%)

Multi-infarct dementia (25%)

Treatable/preventable causes(25%)

DEMENTIA: Treatable/preventable causes

- D Drugs
- E Eyes/Ears
- M Metabolic
- E Emotional
- N Nutrition/NPH
- T Tumors/Trauma
- I Infections
- A Alcoholism/Atherosclerotic

Stages of Dementia

- Vary with cause of Dementia: Alzheimer's slow and progressive decline; MID is a stuttering/step-wise decline
- Alzheimer's Disease: commonly present for up to 8 years before diagnosis made
- 14 year average duration after diagnosis
- Short term memory loss earliest finding
- Followed by poor attention span, long term memory loss, confusion, interpersonal relationship issues, apraxias and behavioral problems

Clinical Driver Assessments:

- **Vision**
- **Visual Perception**
- **Physical Functioning**
- **Cognitive skills**
- **BRAKE REACTION TIME**

Current Assessment of Driving Related Skills (ADReS)

- Visual fields
  - By confrontation
- Visual acuity
  - Snellen or ETDRS card
- Rapid-pace walk
  - Measure of LE strength, ROM, endurance, balance
  - 10 meter walk and return
- Range of motion
  - Neck, shoulder, elbow, fingers, ankle

Assessment of Driving Related Skills (ADReS)

- Motor strength
  - Shoulder, wrist, hand, hip, ankle
- Trail-making test, part B
  - Assesses working memory, selective and divided attention, visual processing, visual-spatial skills
  - Results associated with risk of crash
- Clock drawing test

Clock Scoring for Driving Competency

- Any incorrect element signals a need for intervention:
  - All 12 hrs in correct order, starting with 12 at the top
  - Only the numbers 1-12 included without duplications or omissions
  - All numbers are equally spaced
  - All are equally spaced from edge of circle
  - One hand points to the eleven
  - One hand points to the four
  - There are only two clock hands

The Inexperienced Older Driver: Double Jeopardy?

- More older persons are now starting to drive for the first time or after many years of inactivity
- Normal aging and Age-prevalent illness affect function and ability particularly for those>80
- Need to develop better driving skill courses specifically designed for elderly; data does not show benefit based on age alone for currently available programs

Elderly Drivers: Double Jeopardy?

- Need to develop **better assessment** methodology to better determine driver limitations and needs: cognitive, psychomotor, upper body/neck mobility, lower extremity response, vision!

- Consideration of **specific driving restrictions** for those at-risk elderly needing to drive for quality of life issues but with defined limitations

- Offer Insurance reduction for completed **safety courses and/or assessment**

Making Roads Safer!

- **Low cost modifications to intersections**

  making **traffic signals more visible** and adding a **dedicated left-turn lane** resulted in a 13% greater reduction in injury crashes per licensed driver for drivers 65 and over compared with drivers aged 25-64

- Converting intersections from stop signs or traffic signals to **roundabouts** reduced injury crashes by 76% for all aged drivers

Driving Safely: Extra Caution

- 1. Entering “On ramps” to highways
- 2. While changing lanes on highways
- 3. While making Left hand turns across two way roads

“Geriatric Map-Quest”: Routes with No highways or left hand turns!

Make choices about when and where to drive...

- Plan and consolidate trips and choose routes wisely
- Reduce unnecessary driving
- Drive during daylight when possible
- Avoid driving in congested areas
- Consider using alternate means of transportation such as taxi's (may be cost effective given insurance, auto purchase and upkeep costs)
- Insure Optimal Medical Care and be aware of Medication side-effects and any change in well-being

AMA Ethical Opinion

- Physicians should assess patient's physical and mental impairment
- Tactful discussion before reporting
- Must use best judgment
- Report medical condition that impairs driving safety
- Report minimal amount necessary
- Work with state medical societies to create statutes that uphold patient and community interests and safeguard good faith reporting

Role of Physicians

- Physicians should be strongly urged to report (without risk) any individual with perceived potential for driving unsafely

- Develop Physician CME regarding components of safe driving: be proactive and not wait until an accident occurs to identify those at risk

Safety First!

Resources

- AAA's Driver licensing policies database: http://lpp.seniordrivers.org/lpp/
- Alzheimer's Association: http://alz.org/
- AMA's interactive curriculum: www.ama-assn.org/go/olderdrivers
- Driver assessment programs:
  - ADED http://www.driver-ed.org/i4a/pages/index.cfm?pageid=1
  - AOTA http://www.aota.org/Older-Driver (also has education on assessments)
- Medscape free curriculum on medications and driving: http://www.medscape.org/viewprogram/31244
- NHTSA documents:
  - Driver Fitness Medical Guidelines: http://www.nhtsa.gov/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/811210.pdf
  - Physician's Guide to Assessing and Counseling Older Drivers (also on AMA site): http://www.nhtsa.gov/staticfiles/nti/older_drivers/pdf/811298.pdf
  - How to Understand and Influence an Older Driver: http://www.nhtsa.gov/people/injury/olddrive/UnderstandOlderDrivers/
  - Countermeasures that Work http://www.nhtsa.gov/staticfiles/nti/pdf/811444.pdf